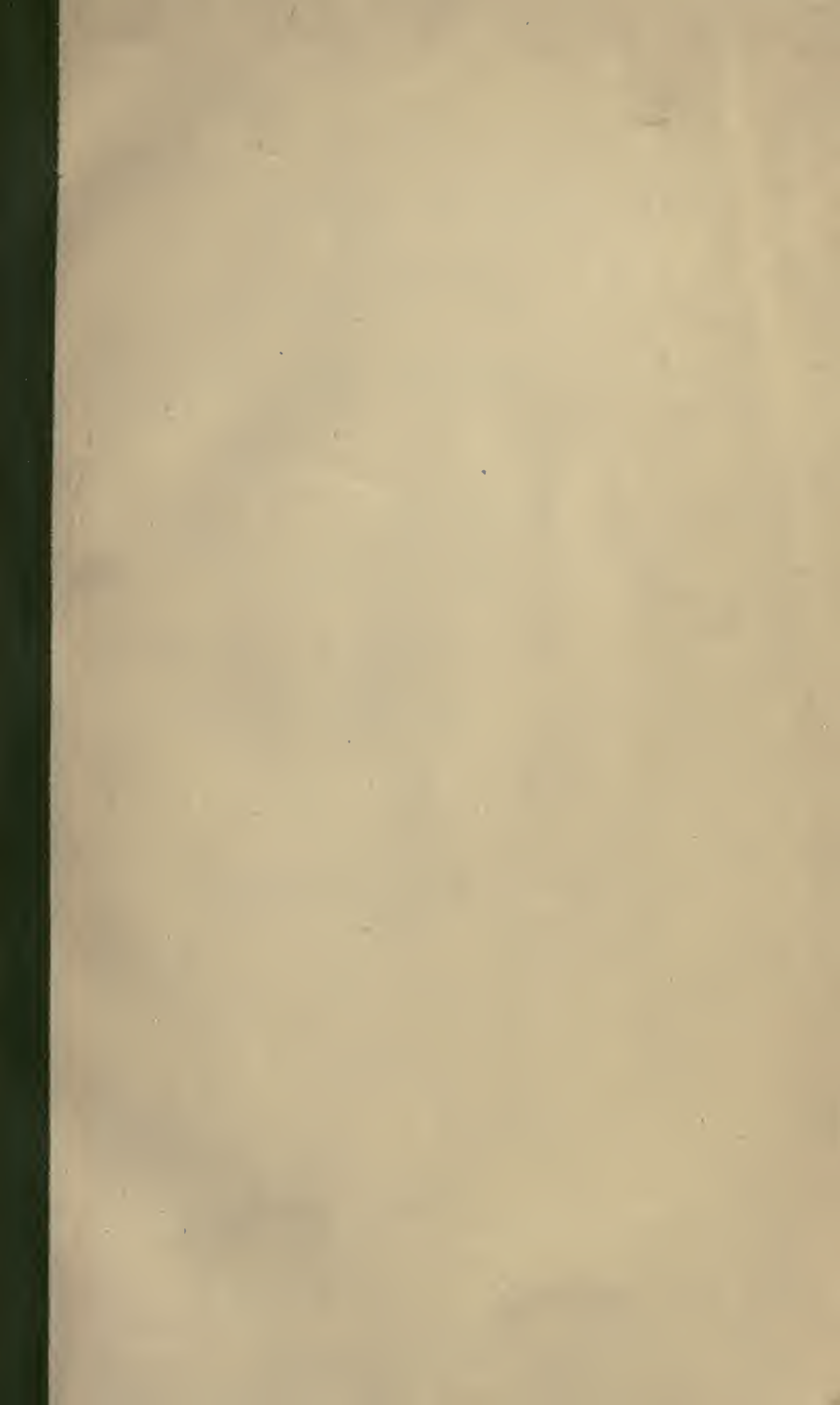


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ON THE

MUTUAL RELATIONS

OF

TRADE AND MANUFACTURES.

A LECTURE

DELIVERED BEFORE THE SOCIETY OF ARTS ON THE
23RD MAY, 1855, ON THE OPENING

OF THE

ANIMAL DEPARTMENT OF THE TRADE MUSEUM.

BY

PROFESSOR EDWARD SOLLY, F.R.S. L.S. & G.S.
Hon. Member of the Royal Agricultural Society of England,
etc. etc.

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ON THE

MUTUAL RELATIONS OF TRADE AND
MANUFACTURES.

IN proposing to consider so comprehensive a subject as that announced for this evening, in the short space of a single lecture, I shall perhaps be deemed somewhat presumptuous ; but as it has been determined to-night to throw open to the members of the Society the collection of Animal produce and manufactures formed under the joint sanction of the Society and the Royal Commissioners for the Great Exhibition of 1851, and designed to form the first division of a general Trade Museum, I am anxious to take the opportunity of drawing your attention to a few more widely-spread subjects of consideration, than those immediately connected with the formation of the Trade Museum.

I do not intend, however, to enter at all into the examination of those great and important questions of political economy which relate to the mutual bearing of trade and manufactures, and the importance of these two sources of national wealth as contrasted with agriculture ; I shall confine myself to drawing your attention to the mode in which either progress or decay in the

one, has always influenced, and ever must influence, the prosperity of the other ; the evils which throughout have arisen from unfair monopolies, and from the wilful or accidental ignorance of technical matters in those by whom restrictions and protective enactments have been framed ; and in conclusion, I shall briefly remind you of the nature and objects of the proposed Trade Museum, and point out some of the ways in which I conceive it will prove of national utility, serving at the same time to illustrate the history of past industry, to indicate the sources of present prosperity, and to suggest the best and most desirable objects for the exertion of future energies.

On looking back to the past history of the commerce and manufactures of the world, it is impossible not to be struck with observing how greatly the progress of individual nations has fluctuated from century to century, and in many cases how little their commercial prosperity has resulted from the wisdom or energy of their rulers. In most instances, a good deal has depended on the active and persevering habits of the people themselves ; and in many cases the most important changes and modifications in the commerce and manufactures of a country, may be traced to causes in operation at a distance, and at first sight apparently wholly unconnected with it.

The increase of any one branch of manufacture—that is to say, the production of any article in much larger quantities than the producing nation is able to consume—always of necessity leads to a corresponding increase in commerce and navigation, though it by no means follows that the producing nation shall reap the whole

benefit of the commerce thus caused. Prosperity from manufacture, and prosperity from trade and navigation, may occur at the same time and enrich the same persons, but there is obviously no necessary connection between the two; for we often find that whilst one country becomes rich and prosperous from certain branches of manufacture for which it possesses peculiar advantages, another nation may derive profit from the sale of those same manufactures to people inhabiting distant parts of the globe. The cases of Tyre and Carthage, in olden time, and the sea-port towns of Italy and Holland in later periods, are familiar illustrations of wealth acquired by commerce almost wholly independent of manufacturing skill or prosperity. These cities were chiefly, if not entirely, marts in which the productions and manufactures of other countries were sold and exchanged. We hear of merchants and traders, but not of manufacturers; and as in the brief, but highly descriptive account of Tyre given in the book of Isaiah, we are told,—“Her merchants are princes, and her traffickers are the honourable of the earth;” so also, in searching for the causes which led to the prosperity of more modern cities, such as Antwerp, we find that it was the resort of traders from all parts of the world, and that its merchants traded in the productions of France, Spain, Italy, England, and Germany; and exchanged the manufactures of these countries with the spices and other tropical productions of the Indies, China, and Africa. The merchant traders were thus collected together in particular cities, which became general emporiums of the trade of the whole world; and we

read of them as living in palaces, surrounded with costly furniture, and all the magnificence and luxury which wealth could procure or the most cultivated tastes desire ; whilst the manufacturers and artisans, with the produce of whose labours they traded, were spread abroad and scattered over large tracts of country ; and hence, whilst we easily recognise the wealth of the merchants of the great trading sea-port towns, we are apt, to some extent at least, to overlook the wealth amassed by the isolated and more widely settled manufacturers. In every case, however, there exists an intimate relation between the two classes ; and whenever merchants prosper, we may surely trace a corresponding and proportionate amount of prosperity in the producing classes, either in the same country or at a distance.

When the martial habits of the Romans began to decline, and when the wealth acquired chiefly by conquest and plunder was made to minister to the artificial wants of society created by luxury, we find them employing the productions of the most distant parts of the globe, and a demand sprung up for many substances which were before unknown, or regarded as useless by their more warlike ancestors. Thus, in the time of Aurelian, silk was sold for its weight in gold ; for the taste for rich garments of silk had continued to increase amongst the people, in spite of the law previously passed by the Senate, “that no man should disgrace himself by the effeminate delicacy of silken apparel.” The Romans were then not a trading people ; their foreign luxuries were all brought to them by other nations, and for their supply of silk they were wholly dependent on the Per-

sians. It is plain that the producers in China must have been paid a remunerative price for their silk, and it is well known that the Persian traders, who bought the silk of the Chinese and sold it to the Romans, made great profit by the traffic; whilst the latter people, at whose expense all this was done, had nothing to do with the production, manufacture, or commerce of silk. They scarcely knew whence it came, and they were ignorant as to its nature, and the mode in which it was obtained.

Early writers make special mention of the extortionate charges of the Persian merchants, and point out how this led to the final destruction of the trade in which for several centuries they had enjoyed a monopoly; for in the year 450 the Emperor Justinian, seeing how the ever-increasing trade in silk tended chiefly to enrich the Persians, was led to try and introduce the cultivation of that article into Constantinople—an attempt eventually successful, though in the first instance nearly frustrated by the avarice of the Emperor, who assumed to himself the entire monopoly of the production of silk, and sold that made in the imperial manufactory at a price nearly eight times as high as that previously paid by his subjects to the Persian traders.

The history of the silk and woollen manufactures, and the trade in articles made from those substances, afford a number of interesting illustrations of the mode in which most manufactures have spread, and the vicissitudes to which commercial prosperity has ever been exposed. In the first instance, we generally find a particular place or country celebrated for some special

kind of manufacture ; gradually it becomes an article of export to other countries, and the exportation is profitable. Then ingenuity is set to work to improve the manufacture or simplify the processes ; and these improvements, by diminishing the cost of production, increase the exportation and render the trade still more profitable. After a while competition commences : the profitable trade leads others to try and compete with the first producers ; and a more active people, a more favourable climate, cheaper labour, or increased mechanical skill, form powerful rivals. Sometimes they only act as a stimulus to call forth more energy and more active exertion ; but often the original manufacture is destroyed, and its seat transported to another country. Sometimes, too, the same result is brought about by political or religious revolutions ; and occasionally we find a trade suddenly ceasing in consequence of the demand for an article being altogether destroyed, and some new material substituted for the purpose to which it had previously been applied. There is a remarkable instance of this in the manufacture of Chamois leather for military clothing, with which England supplied most of the European armies at the close of the last century. The material was excellent in time of peace and worn on parade and in ordinary garrison service, but it was not fit for active warfare. This was found out in the course of the Peninsular war. The use of leather clothing was discontinued not only in the English army, but also in that of most other European countries, and the English manufacture of Chamois leather was almost abandoned.

If we study the commercial history of the whole

world, we are enabled to trace out the gradual development and steady increase of each branch of manufacture in a manner which, for the reasons just mentioned, it is hardly possible to do if we confine our inquiries to the history of a single country. The intelligence and technical knowledge of mankind is ever on the increase, though the skill and prosperity of particular nations may decrease. Now and then a special process or even an entire branch of art is lost ; but this is more than compensated by the advance which is constantly taking place in other arts. The power-loom, the Jacquard-loom, and the stocking-frame, were each of them immense improvements on the modes of manufacture previously in use ; but if we trace their effects on any one single country alone, we obtain a very partial and imperfect idea of the real influence which they have exerted on manufacturing prosperity generally.

The mutual relation of manufactures and trade is shown by the manner in which anything which increases the facilities of transit or navigation, by facilitating commerce, acts as a stimulus to manufacture ; just as on the other hand every great improvement in manufacture as necessarily leads to an increased development of commerce. Writing on the influence of cheap and rapid transit on commerce, Adam Smith remarked in 1775, that in order to convey four tons of goods from London to Edinburgh and back, a broad-wheeled waggon, attended by two men and drawn by eight horses, would be employed for six weeks, a fact which serves well to illustrate the effect of railways, as the same work is now easily performed in two days. Changes such as

these not only modify existing commerce, but also call into existence many new sources of trade. For example : a traffic in fish, eggs, fruit, and fresh provisions, could easily be carried on between places as far distant as London and Edinburgh with the facilities of railway conveyance, which with nothing but the old broad-wheeled waggon would be obviously impossible.

So also the gradual improvement in the monetary system of nations, the establishment of systems of exchange, banks, and bills, has had a most important bearing on the prosperity of manufactures and the spread of commerce. In the time of Homer the current coin of the realm was oxen : and we are told that whilst Diomedes paid nine oxen for his suit of armour, that of Glaucus cost him one hundred head of cattle ; and there can be no doubt that the introduction of a portable and more divisible mode of payment must have greatly facilitated the buying and selling of merchandise.

From the very earliest periods of history, commerce has received the especial attention of kings and governments, and commercial laws and enactments are to be found amongst the most ancient statutes on record. Legislative influence has been brought to bear on trade and manufactures in various forms ; the chief being the imposition of duties levied as a means of revenue,—protective duties, ordained with a view to protect certain branches of industry against other branches, or against the importation of cheap foreign wares,—patents, bounties, privileges, and other kinds of special encouragement, granted with a view of fostering and assisting in the improvement of particular trades.

On carefully studying the commercial history of the world during the last seven centuries, one is led to question whether on the whole legislative interference has not done more harm than good. Certainly, if it be assumed that the various enactments made were faithfully drawn up, and honestly intended to benefit arts and commerce, it is lamentable to observe in how many instances they have frustrated the very objects they were enacted to assist. In most instances we find that whilst vested rights, having powerful friends at court, were assisted and protected with fines and duties, the true interests of the nation as a producing, manufacturing, and exporting country were left to chance, or sacrificed to ignorance and cupidity.

We must, however, not include in this general criticism, those promises of bounty and encouragement, which in the history of each country we find the wisest and most intelligent monarchs offering to the ingenious artisans of other nations, as inducements to come and settle in their dominions, and thus introduce those arts for which they have become celebrated in their own countries. Frequently, from some political, or religious disturbance, the inhabitants of a manufacturing district have been led to emigrate, carrying their families, work-people, and factories with them; and, in such cases, the neighbouring monarchs have often endeavoured by promises of patronage and protection, to induce the fugitives to seek a new home in their dominions. Thus, for example, in 1331, on the occasion of disturbances in the Low Countries, Edward III. granted a special letter of protection to any workers in wool, who would come over

and settle in England. His invitation was accepted by about seventy Walloon families, and we may even to this day trace the influence and effects of the new blood thus introduced into the woollen manufactures of the country. Again, two centuries later, when the cruel tyranny of the Duke of Alva induced the inhabitants of Antwerp and other cities in the Netherlands to fly from their native country, the wise policy of Elizabeth caused many of them to come over into England; and then again, our woollen manufactures received a most important impetus and advancement.

But the species of legislative interference with manufactures to which I have referred, is that which we find in such Acts of Parliament as, for example, the Act of 1571, passed to favour the knitted cap makers, who had become jealous of the new felt hats, then recently introduced, and which seemed likely to replace the knitted caps altogether. It was therefore enacted, that every person above the age of seven years, should wear a woollen cap of English make on Sundays and holidays, on pain of forfeiting 3*s.* 4*d.* a day, if they neglected to wear such a cap—lords, knights, and landed gentry, being, of course, excepted—or, again, in the Act of 1721, enacted out of compliance to the wishes of the silk button makers, wherein it was ordained, that no one should henceforth wear buttons covered with wool, or cloth, on any pretence whatever. Acts of this sort tended to injure trade, and though in many instances the penalties were very heavy, they hardly ever fulfilled the purposes for which they were passed, because they were generally evaded. Thus, the Act of 1566 against the

importation of live sheep—passed, partly with the idea that the English sheep was the only kind in the world, bearing wool suited to the manufacture of broadcloth—the penalty for the first offence was forfeiture of a man's entire substance, imprisonment for a year, and the loss of his left hand; whilst the second offence was made felony, without benefit of clergy. In those days, it is well known, many an illegal act was allowed to pass unnoticed, if the transgressor was able and willing to pay a handsome sum by way of fine; and, moreover, smuggling existed to a very large extent.

Two chief reasons have from time to time been advanced, in justification of these, and a thousand similar enactments: the one was, protection to native industry—the other, preservation of the balance of trade. The time has now come, when it is pretty generally acknowledged that protection of one class implies injustice to another, and that a trade which needs protection to guard it from the rapid advances of some other branch of industry, considered in a national point of view, is seldom deserving of protection. The so-called balance of trade is also fast becoming a matter of history; though we may trace the evil influence caused by its introduction into commercial legislature to a very recent period; it is now generally admitted that a trade in order to be lasting must be profitable to those who carry it on, and that if the exportation of a certain quantity of goods does not bring back in return goods of still greater value to the country so exporting, such a trade would soon cease to be worth carrying on.

The trade between this country and France has for

centuries suffered from the measures taken to preserve this imaginary balance, which have often led to the most unwise and injurious restrictions. Invariably, we find, that the imposition of prohibitions and high protecting duties on the importation of foreign manufactures, has had a depressing effect on our own manufactures ; and on the other hand, benefit has nearly always arisen from the reduction, or abolition, of such duties. When in 1628, King James, observing how large a quantity of undyed broadcloth was exported to Holland, the Dutch being more skilful dyers than the English, determined to prohibit the exportation of undyed cloth; he endeavoured at the same time to improve the art of dyeing in England, and to secure to himself a revenue from the sale of home-dyed cloth, of which he proposed to retain a monopoly. The attempt wholly failed, for, as might have been expected, the Dutch and most other importing foreign nations, at once prohibited the importation of dyed English cloth, and King James's project had to be relinquished.

Again, when in 1824, it was determined to admit French manufactured silks into England, it was ordained that a period of two years should elapse before the new law came into operation, under the supposition that this time was necessary to enable our manufacturers to prepare for the competition to which they would then be exposed. But the time thus permitted to elapse, was employed by the French manufacturers in preparing large stocks of goods ready to be introduced into England as soon as the new duty came into operation ; and hence our manufacturers again took fright, and

a new and most illiberal enactment was made. The silk manufacturers of France were all in the habit of making their goods of a certain length; to prevent, therefore, the importation into England of any of the large stock of goods manufactured for the English markets during the two years between the passing of the act of 1824 and its coming into operation in 1826, a fresh Act was passed just before the latter period, enacting that no silk goods should be imported unless they were of a length somewhat longer than the standard length adopted by all the French manufacturers. It is curious to observe how this illiberal and unwise Act, in fact, increased the very evil it was intended to obviate. It at once produced an immense increase of smuggling, and in place of having to compete with French goods imported under a moderate protective duty, our manufacturers had, in fact, to compete with the same goods brought in without paying any duty at all.

Another good example of the same effect is afforded by the policy of the French government towards England early in the present century. With a view of injuring the commerce of England, they prohibited the importation of a considerable number of articles of merchandise into France; this completely interrupted the whole system of European international trade, and led the Swiss to abandon some of those branches of industry which they had hitherto carried on, and to enter largely into the silk manufacture. Thus the attempt of the French to injure the cotton trade of England, led to the establishment of a formidable rival to their own silk trade.

In many of these enactments it is remarkable how much want of knowledge is shown; it is evident that party favour and patronage was the real cause which led to a large number of them: but independent of this, and where no unfair partiality was intended, it is plain that those in power not only did not possess the information necessary to lead them to form correct judgments respecting the interests committed to their supervision, but that in fact it was not in the power of any one to supply them with such knowledge. I have already mentioned the fact that the Romans were ignorant of the source of silk, believing it to be a vegetable production,—and as an illustration of this, the passage in the second book of Virgil's *Georgics* is often quoted, in which he speaks of the Indians as combing the soft fleeces of the bough, an expression also used by Herodotus and Theophrastus. An error such as this is hardly to be wondered at when we remember the tedious and uncertain communication which then existed with so remote a country as China; we need not, however, go so far back in history for examples of commercial ignorance far more remarkable than this. It is difficult to believe that scarcely two centuries since the following was gravely stated by Isnard as the mode of rearing silkworms.

“Take a cow, about to calve, and feed her on mulberry leaves alone till she has calved, and continue to feed both her and the calf on the same food for eight days; then kill the calf, and chop it up entirely into mincemeat, and place this in a wooden trough at the top of a house, in a garret or loft; when the whole

is thoroughly corrupted, numerous small worms will be found in it, which must be carefully picked out and fed on mulberry leaves ; this is an infallible receipt."

This extraordinary story was gravely copied by both Pomet and Lemery, writers of no inconsiderable repute at the end of the seventeenth century, though the latter, it must be added, appends by way of commentary, that the receipt needs confirmation.

Another curious illustration of how little was known of the true nature of the most important articles of commerce, is afforded in the history of cochineal. So recently as 1724, a Dutchman, named Reusscher, publicly stated that this dye-stuff was, in fact, the dried body of a small insect ; his statement was denied by one of his townsmen, who asserted most positively that it was the seed of a plant ; and the dispute was carried to such a length, that a commission was appointed to investigate the matter in Mexico, and the legal documents establishing the animal nature of cochineal arrived in Amsterdam in October, 1726. It is stated by Beckman that the advocate of the vegetable origin of cochineal was so confident of the truth of his view of the subject, that he had betted the whole of his fortune on the result of the enquiry.

Another curious illustration of want of knowledge in framing legislative enactments, is shown in the proclamation issued by King Charles I., in 1630, ordaining, amongst other things, that no silk shall be dyed in the gum, or before it has been entirely removed by boiling ; yet, eight years after, we have a counter-proclamation in which this restriction was removed, the proclamation

stating that the King had now become better informed on the subject, and understood that silk so dyed was proper for the manufacture of taffetas, figured satins, ribbons, and ferrets ; but our admiration at the unusual candour of this edict has hardly passed away, before we find the same monarch ordaining that no person should be admitted into the Weavers' Company unless he was a member of the Established Church of England.

The progress of improvement was, however, more often impeded or retarded by protective enactments arising from the influence of existing interests than from mere ignorance; thus it is curious to observe the violent opposition which indigo met with on its first introduction as a substitute for the old Saxon dye-stuff, woad. It is stated by Schreber, in his history of that substance, that, on the introduction of indigo, the German Diet, in 1577, strictly prohibited all persons, under the severest penalties, from using the "newly-invented, pernicious, deceitful, eating, and corrosive substance called the devil's dye;" which enactment was confirmed and continued by the Diet again in 1594 and 1603; and still more strongly by Duke Ernest, the Elector of Saxony, in 1650; nay, so far was this persecution of indigo carried, that in Nuremberg a law was passed compelling all dyers to take a yearly oath that they would not use indigo, and the custom of taking this annual oath so far became one of the acknowledged habits of the trade, that it was kept up long after the value of indigo was generally acknowledged, and its use universal amongst dyers.

In France, too, a similar war was declared against

indigo, and it was not till so recently as 1737 that dyers were permitted to make use of it without restriction.

In our own country the same kind of legislative interference took place with regard to logwood. The ground on which it was declared objectionable was, that the colours dyed with it were fugitive and uncertain; hence in the twenty-third of Elizabeth, 1581, an Act of Parliament was passed, prohibiting the use of logwood by dyers, on the ground that "the colours thereof be false and deceitful to the Queen's subjects at home, and discreditable beyond sea to our merchants and dyers." And, because this Act had not the desired effect, and the use of logwood continued to spread, two additional ones to the same effect were passed in 1597 and 1630, and the restrictions were not repealed till 1661, when, by the thirteenth of Charles II., it was set forth, that "the ingenious industry of these times hath taught the dyers of England the art of fixing the colours made of logwood;" and therefore permission was given them to make use of it.

It is curious to observe how in all these edicts against the use or introduction of any new substance, care was taken to make out as good a case as possible by loading the denounced import with as many hard names and evil epithets as possible. King James's proclamation on the use of tobacco is a remarkable instance of this; for he has ingeniously contrived not only to describe the tobacco itself as noxious and unwholesome, but he has, at the same time, managed to cast a slur upon all those who ventured to smoke. It runs thus:—

"Whereas, Tobacco, being a drug of late years found

out, and brought from foreign parts in small quantities, was taken and used by the better sort, both then and now, only as a physic, to preserve health; but it is now, at this day, through evil custom and the toleration thereof, excessively taken by a number of riotous and disorderly persons of mean and base condition, who do spend most of their time in that idle vanity, to the evil example and corrupting of others, and also consume the wages which many of them get by their labour, not caring at what price they buy that drug; by which immoderate taking of tobacco the health of a great number of our people is impaired, and their bodies weakened and made unfit for labour: besides that also a great part of the treasure of our land is spent and exhausted by this only drug so licentiously abused by the meaner sort,—all which enormous inconveniences we do well perceive to proceed principally from the great quantity of tobacco daily brought into this our realm,” etc. etc.

It is probable that in no instance has any great improvement been absolutely prevented by these species of enactments, though there can be no doubt that many have been greatly retarded. Upon this subject Beckman truly observes:—

“Legislators are neither almighty, omniscient, nor infallible; with the best views, and a firm determination to discharge their duty, they may recommend things hurtful, and prohibit others that might be attended with advantage. Were their commands and prohibitions inviolable, insuperable, and inscrutable, they would often confine the progress of the arts and sciences, and render

useful inventions impossible. But the people, when they have not entirely become machines, know how to elude, even at great personal hazard, faulty regulations, and by prohibited ways to obtain greater advantages than those which formed the object of the orders issued by their government."

Such laws for the regulation of particular arts are as unreasonable and as quaint as the enactment of King James, in 1617, "that all noblemen, knights, and country gentlemen should depart out of London, within twenty days, and go to their country houses, for the exercise of hospitality, and for the comforting of their neighbours."

Whilst, however, we thus find numerous instances of the evil produced by restrictions on the freedom of manufacture, at the same time we also find curious examples of the waste of money and energy in attempting to foster and establish arts to which the country, from physical circumstances, is unfitted; thus, for example, when at the close of the sixteenth century, the silkworm had been successfully introduced into the whole of the south of France, King James determined to introduce it into England, and with this view issued a circular letter in 1608, established a mulberry garden at St. James's, and made special reference to the cultivation of the silkworm in his speeches from the throne. In the preamble to his circular, he states that, "in a few years, our brother the French king hath, since his coming to that crown, both begun and brought to perfection the making of silk in his country." Here the difference in climate between the two countries was

altogether overlooked, and the conditions necessary to success in such an experiment were completely forgotten.

In most of the large experiments of this sort, as in the protective enactments which, from time to time, have been ordained, the subject has been treated in a circumscribed and limited manner, and hence the unsatisfactory results to which they have so often led. The manufactures and the commerce of the country have been dealt with in an isolated manner. Instead of taking into consideration the position, resources, and activity of other countries, it seems to have been too often forgotten that our enactments did not influence our own country alone, but must at the same time also affect other countries. Our legislation was, in fact, for the whole world, but the data on which that legislation was based were drawn from considerations connected with a single country, and, in fact, often connected with individual interests. In dealing with our colonies the same course has been pursued. We have acted as though there were no other nation on the globe but England and her colonies; and hence altogether overlooked the influence which foreign countries could not fail to exert on the true balance of trade, the relative manufacturing and commercial prosperity of all the countries of the world.

The history of all great national improvements in manufactures is highly curious and instructive. In the cases to which I have recently referred, where the government of the country has directly interfered to aid and encourage a particular branch of industry, we

find many instances like that of King James, which necessarily failed for want of the most simple and necessary elements of success,—true principles, and favourable natural conditions; but there are many others in which entire or partial failure was caused in consequence of the mode in which such interference took place. Thus, in the reign of Henry IV. of France, when the introduction of silk culture was first attempted, the government formed large nurseries, and freely gave mulberry cuttings and silkworm eggs to all persons willing to receive them, and even went to the cost of transplanting the mulberry-trees to the gardens of the peasants. This excess of liberality entirely defeated its object, and the whole thing fell into disrepute. After a few years the system was altered; rewards were given to those who had successfully established silk plantations; and the leading manufacturers who had carried on the manufacture longer than twelve years received titles of nobility.

I shall not now attempt to go into the subject of patents for inventions, or consider in how far the creation of such monopolies have aided the progress of manufacturing ingenuity, though this question is doubtless intimately connected with the matter under consideration. Theoretically, improvements in manufactures may be said to arise either from increased commerce calling for an increased supply of the manufactured article, or from a hope of obtaining increased profit by diminishing the cost of production. The practical fact, however, is, that most of the great improvements in manufactures have been the result of accident rather than of design,

and have, in many instances, been originated by very different motives ; hence, the ideas suggested have been taken up by others, and brought to perfection, whilst the original designer has too often died in misery and disappointment.

The invention of the stocking-frame, or loom, in the early part of the seventeenth century, by Lee, which, in fact, created a new and most important branch of manufacture, is an example of this. Lee was the son of a country gentleman, a Master of Arts at St. John's College, Cambridge, and apparently in no way connected with trade. The idea of making a knitting-machine, it is said, came simply from his seeing a country girl at work, knitting stockings with needles. Having completed his loom, and established works near Nottingham, he applied to Queen Elizabeth for aid and encouragement, and, receiving none, but rather being impeded, he left the country, and accepted an invitation from Henry IV. to settle at Rouen. The assassination of the King put an end to Lee's prospects of encouragement, and he soon after died in the greatest distress. However, the invention was perfected ; it continued to spread in both England and France ; and on the revocation of the Edict of Nantes in 1685, when the artisans of France were compelled to seek refuge in other countries, the stocking-loom was carried into all parts of Europe.

Few inventions have had greater influence on the progress of our manufactures than the power-loom ; yet this was designed and brought to perfection in 1787, by the Rev. Dr. Cartwright, a man not only wholly unconnected with manufactures, but even quite ignorant

of the mode of weaving by hand. It is notorious that Dr. Cartwright expended nearly 40,000*l.* in introducing the power-loom ; that he was met with all the delays, annoyances, and opposition which narrow-minded prejudice could raise, and that he finally received a sum of 10,000*l.* from the nation, by way of compensation.

It is a curious historical fact that the general scheme of the power-loom was communicated to the Royal Society, and published in their Transactions, in 1678, more than a century before the date of Cartwright's invention ; yet the idea seems to have been regarded, by scientific men, as quite impracticable, and by practical men as unworthy of a trial. At all events, no attempt appears to have been made to test its value.

It would be easy to multiply instances, but I have said enough. I will only remind you that the Jacquard-loom was invented by a straw hat maker, whose attention was first turned to weaving by the premium-list of this Society, which accidentally fell into his hands ; that the man who practically founded the cotton manufacture of the country, by the invention of the spinning rollers, was not a cotton-spinner, but a barber ; and that James Watt, when he first turned his attention to the improvement of the steam-engine, was a disappointed spectacle-maker.

We see, then, that the progress of commerce and manufactures has gone on, in a manner, wholly independent of the laws and regulations of man. The enactments of governments, intended or professed to aid them, have in many instances failed, and not unfrequently produced results of the most opposite character to that which was

intended ; whilst the greatest advances have been caused by religious, political, and social revolutions in the first instance, in no way connected with either arts or trade ; or have arisen from the accidental discoveries of persons engaged in perfectly different pursuits.

I have hitherto chiefly adverted to the influence possessed by government enactments, because the power thus exerted, whether beneficial or otherwise, is to a certain extent immediate and absolute. The edict comes out with full authority ; it becomes at once the law of the land, and must be obeyed ; and hence, whilst wise and sound government interference is above all things valuable, so ill-considered and partial measures are peculiarly injurious ; they fetter and cripple honest trade, though they never prevent the exercise of dishonest ingenuity.

In looking, however, at the various influences which bear upon the prosperity of manufactures and trade, we must not pass over the very important influence possessed by those occupied in the arts and commerce themselves. This influence is necessarily very great, and is shown in a number of different ways. There are, however, only two of these to which, for the object now before us, I desire to draw your attention ; and these are, adulteration and mystery. From the very mode in which trade is carried on, and from the number of hands through which most articles pass, great facilities are given for careless preparation and skilful adulteration of the raw produce ; and it is very difficult for the manufacturer who consumes it to persuade the producers that it would be to their advantage, as well as to his conve-

nience, if such practices were discontinued. Unfortunately, too, even in many branches of manufacture carried on in our own country, adulteration, and admixture of inferior materials, is practised to an enormous extent. These are evils almost beyond the power of government interference, and can only be well remedied by the men themselves who carry on these manufactures; and for this a certain amount of combination and unity of purpose amongst them is needed, which, unfortunately, seems hardly compatible with that competition and rivalry which many consider inseparable from trade. Why is it that adulteration is not only permitted, but even encouraged in many instances? Why, for example, should feathers, hair, sponge, and many other articles, be openly and confessedly adulterated, so that when brought over in a clean and pure state they are looked on with suspicion, or even rejected as not marketable? I do not mean to refer to the adulterations too often carried on by retail dealers, but to the wholesale adulteration of the raw material itself, which necessarily depreciates its value, and renders a process of purification the first stage in any art in which such materials are employed. It is bad enough when such admixtures are made in this country; but the evil is more than doubled when it is carried on in a country thousands of miles distant, as then the article adulterated has to bear the cost of freight of the impurities thus added, in addition to the cost of the process necessary for purifying it.

On the subject of trade mystery I will only observe, that I am convinced that it would be far more to the

interest of manufacturers if they were more willing to profit by the experience of others, and less fearful and jealous of the supposed secrets of their craft. I am perfectly well aware that there are cases in which it is in fact necessary that each man should keep his own counsel ; as, for example, when a new market for a particular article has been opened to an enterprising firm, it would clearly not be to their interest to communicate this new source of profit to their neighbours and rivals ; this, however, is not the secretiveness to which I refer, it benefits some, but does not in any way injure others ; whilst the tendency to mystery amongst manufacturers and artisans, in truth benefits no one, and, at the same time retards the progress of ingenuity, and fetters the development of national industry. In the course of the last few months, the extensive intercourse which I have had with practical men, has led me to feel the truth of this strongly ; for, whilst I have often found them to a great extent ignorant of the progress of their art in other parts of the world, they have, with few exceptions, been anxious to guard from others various practices and processes which, in truth, were no secrets at all. It is a great mistake to think that a successful manufacturer is one who has carefully preserved the secrets of his trade, or that peculiar modes of effecting simple things, processes unknown in other factories, and mysteries beyond the comprehension of the vulgar, are in any way essential to skill as a manufacturer, or to success as a trader. How have the great manufacturers of England acquired their reputations and amassed their fortunes ? How have

our Bramahs, Cubitts, Fairbairns, Holdsworths, Salts, Marshalls, and a hundred others, attained that world-wide reputation which they so well deserve? Was it by the petty mysteries of trade, and by a jealous preservation of the secrets of their forefathers? or, was it not rather a necessary result of a very simple combination of circumstances? The employers were men of unwearied energy, inflexible honour, and sterling integrity; their work-people were well-selected, well-trained, well-treated, well-directed, and well-paid! These, I believe, are the true secrets of trade prosperity; but they are secrets which no one need fear to communicate to his rivals.

I now turn to the more special object of to-night, namely, the Trade Museum; and having briefly stated its objects, and what I conceive it ought to contain, I shall endeavour to show to you how it would possess a most important influence on the manufactures and commerce of this country and our colonies.

The Trade Museum should contain samples of the productions of all parts of the world, both raw and manufactured; there should be samples of the leather, wool, silk, woods, gums, oils, dye-stuffs, drugs, stones, ores, and other productions, whether wild and indigenous, or the result of cultivation; so that a visitor could at once compare the silk or wool of France, Russia, Sweden, Italy, or England, with that of Canada, the United States, Persia, China, the East Indies, South Africa, or New South Wales. Again, if he wished to see the productions of any country, he should find arranged together in proper order the produce of each

country, so that he could at once know those which form articles of commerce, and those not at present imported. These are two perfectly distinct kinds of information, and the Museum ought to afford them both.

Secondly, there should be illustrations of all manufactures, from the collection or raising of the raw produce, through every stage or operation to which it is subjected, down to the most finished products; and these should be so complete as to exhibit all the more important variations in the process employed in different countries. Thus, we should not only be able to compare the broadcloth of our own country with that of France, Germany, Belgium, and other countries; but we should also have the means of simultaneously comparing them in every stage of manufacture, beginning with the raw wool, its scouring, combing, carding, spinning and weaving, dyeing and dressing. For this purpose the tools, implements, and machinery should be shown, accompanied by working specimens showing progress, and illustrating the advantages and disadvantages of each process. For example, the dressing of broadcloth of necessity involves the illustration of the means used in raising the surface, the use of teazles both by hand and by machine, and the convenience and faults of the various mechanical contrivances which are employed as substitutes.

Thirdly, the Museum should show progress. It should contain specimens of raw and manufactured articles of known age, for the purpose of comparison with those of the present time, in order that the precise kind of improvement effected may be accurately known and estimated—an element which is quite essential in any

attempt to generalise, or to arrive at correct conclusions as to the future progress of any art.

It is almost superfluous that I should point out the necessity of good arrangements in such a Museum, or that I should insist on the importance of the specimens being properly shown, properly preserved, and carefully labelled; it is obvious that much of the practical value of the Museum would depend on these matters. The labels in particular are all important; they should at once express clearly and distinctly the nature and state of each article, and the specimens should be accompanied by maps and drawings illustrating those matters which cannot otherwise be explained. Thus, the cultivation of rice, tobacco, and sugar, needs drawings to show the peculiar modes of tropical farming, and the methods adopted for irrigation; whilst the Sea Island cotton, in addition to these, should be accompanied by maps showing the peculiar geographical conformation of the lands in which it is grown. Lastly, the information conveyed by the specimens and their labels should be extended and completed by a good descriptive catalogue, which should contain all those further commercial, scientific, and statistical facts necessary to the complete elucidation of the history of each substance, its production, and its uses.

In order to be practically useful, such a Museum should be situated in London, within reach of merchants and others likely to desire that information which it would be calculated to give; but I conceive, in order to render it thoroughly useful, it ought to be made a centre for the dissemination of technical knowledge, and for

aiding local museums in all parts of the country, and indeed in its colonies also. When, for example, a specimen of any new sort of produce was received, it should if possible be divided into several portions, one to be preserved in the best possible manner for future reference, whilst the remainder should be employed in practical experiments, and sent to other similar establishments in the manufacturing towns and elsewhere.

It would be difficult perhaps to obtain at all a complete collection in illustration of the progress of any of the older arts and manufactures, though a vast number of valuable illustrative specimens might no doubt be collected; it would, however, be easy to record the present state of the arts, and the specimens collected for this purpose would soon become historical, and the work which now might be completed with comparatively little trouble, would in a few years become as difficult as it now is to collect records of the progress of the last century.

I conceive that the Museum should be essentially progressive; that it should always show the most recent improvements in each art; but that the illustrations of the progress of past years should be carefully preserved for reference, as in many instances most valuable information may thus be derived.

In this brief detail of the chief objects which I conceive should be borne in mind, in carrying out the formation of a General Trade Museum, I am aware that the scheme is a large one, and one involving much labour and considerable expense; but I feel that the objects contemplated are all of importance,

and that though it would be of much value if only part of it were carried out, yet that while collecting materials for one portion, a very little more trouble would enable us at the same time, also, to collect those for all the other departments of the Museum. Such an establishment would be of the greatest practical value to merchants and manufacturers, and would supply them with information, the importance of which can hardly be too highly rated. I have, during the past few months, had many examples of the superiority of illustrative specimens over mere printed descriptions; for I have had many visits from practical men, who, though in the outset they have said, "*your Museum would be of no use to us,*" have, nevertheless, after a little discussion, and above all after examining specimens in illustration of special arts, gone away in a very different spirit, saying—"*I have learned some practical facts which I never knew before, and which will be of considerable use to me.*"

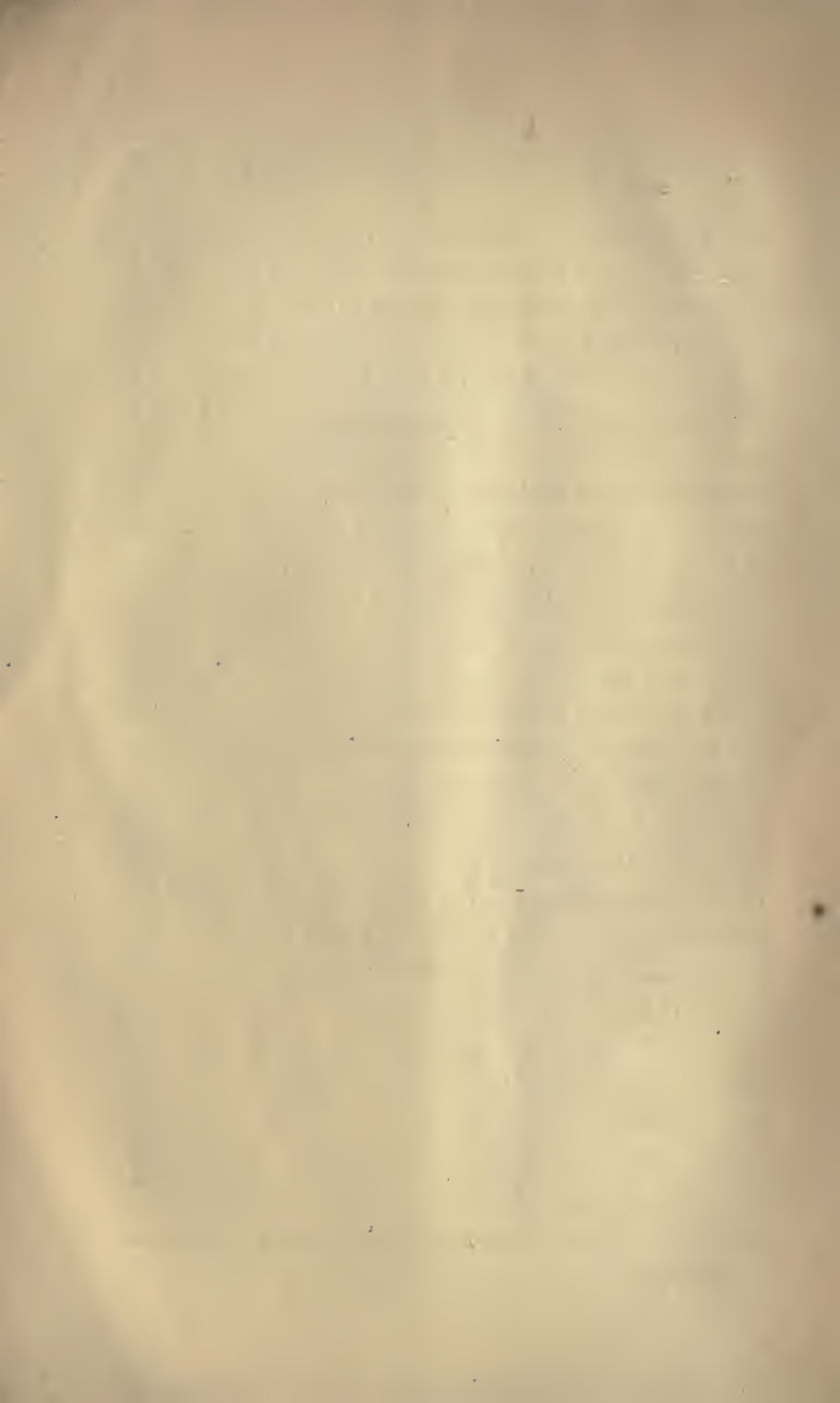
But it is not only to merchants and manufacturers that such an establishment would prove of value; let me remind you of the innumerable technical questions which have arisen during the past year alone, respecting the productions of those countries which border on the Baltic and the Black Sea. How valuable a complete collection of the coals of Asia Minor, accompanied by scientific and statistical information, would have been, when first the question of supplying our steam fleet in the Black Sea with coals was under consideration; and how useful would the Trade Museum have been, when the relative value of different kinds of preserved and portable food was being discussed, had there existed

an authorised establishment in which specimens of these various articles had been deposited and exposed to varied circumstances for a definite number of years?

In conclusion, let me state very briefly what has been done towards the commencement of such a Museum. You are aware that the Council, acting with the sanction and co-operation of Her Majesty's Commissioners for the Great Exhibition, determined to form a collection of Animal produce and illustrations of those arts in which animal substances are employed, and in this work I have for some months been busily occupied. A portion of the collection is now arranged in the model room, and will remain open to the members of the Society, and to the public, for some time ; during which, I trust some determination will be arrived at as to the future progress and destination of the Trade Museum, of which this forms the commencement.

I must remind you, that the state of affairs, both political and commercial, all over Europe, for the last year, has been peculiarly unfavourable to the collection of foreign produce and manufactures, and that I have had great difficulties to contend with in the collection of specimens, and the formation of anything approaching to a tolerably complete series of the chief animal substances used in the arts. As regards the collection now in the Model-room, it has been arranged with extreme haste, the late exhibition of inventions having rendered it impossible to commence the disposal of the Animal collection till a few days ago ; whilst the very limited accommodation afforded by the room, has rendered it necessary to exclude a very large part of

the collection, some portions being altogether unrepresented. The specimens must be considered as being only temporarily grouped together, and not arranged as they would be in a permanent Museum. The collection is numerous, and complete enough to show the practical nature of such a museum, and to illustrate some of the kinds of knowledge which it would convey, and some of the purposes to which it might be applied; and I would only, in conclusion, express an earnest hope that the commencement thus made by the Society will be taken up with spirit, and prosecuted with energy. That the Museum will be thoroughly appreciated ere long by practical men, I entertain no doubt whatever; and I may truly state, that the most difficult part of the undertaking, the formation of a nucleus, is now accomplished; it will be far less trouble to supply the deficiencies in the Animal series, and to complete the other departments of the Museum; and from the numerous and increasing promises of aid which have lately been made, I feel confident that there will be no difficulty whatever in fully carrying out the formation of the General Trade Museum, as soon as the permanent establishment of such a collection, and its location in a suitable place, shall be decided on.



APPENDIX.

EXPLANATORY MEMORANDUM,

Descriptive of the Selection of Samples of Animal Produce and Manufactures, now exhibiting in the Model-room of the Society of Arts, and forming part of the TRADE MUSEUM, Animal Department, undertaken by the Society with the sanction and co-operation of Her Majesty's Commissioners for the Great Exhibition of 1851.

THE collection is designed as the commencement of a General Trade Museum, or collection in illustration of the productions, industrial resources, manufactures and commerce of all countries. The portion now brought together is confined to Animal products alone. In consequence of the extent of the collection, and the limited space which could be devoted to it, it has been found necessary to exclude many articles altogether, and leave out many important illustrations in each series. The following brief memorandum is prepared for the purpose of giving a general idea of the scope and nature of the collection, and the order in which the specimens have been arranged. The division employed is merely a technical one, adopted for convenience of classification; the mode of arrangement was necessarily suited to the form and appliances of the room. The series commence at the south-east corner of the room.

1.—WOOL SERIES.

Extending along the whole of the south and west sides of the room, and including fleeces and samples of all the chief varieties of Wool, British, Colonial, and foreign; illustrations of the manufacture of most woollen fabrics, dyeing of wool, samples of broad and narrow cloths; tweeds, Tartans, flannels, felts, cords, &c.; Coburgs, merinos, lastings; alpaca and mohair fabrics, plush, moreen, damask, carpets, fancy wools, &c. Pilots, petershams, witneys, shoddy manufactures, manufacture of woollen paper, and flock paper.

2.—SILK SERIES.

Arranged along the north side of the room; including the silk-worm and its economy; the wild silk-worms of India, allied moths, cocoons. Raw silk, British, Colonial, and foreign—organzine, thrown, and tram silks; silk-dyeing—weaving plain silks, persian, sarcenet, gros de Naples, watered silks; satins, velvets, fancy weaving, the Jacquard-loom, fancy silks, silk poplins, silk damasks, ribbons, silk laces, trimmings, small wares, buttons. Manufacture of waste silk—silk-hat making. Historical specimens showing the progress of silk-weaving.

3.—SKIN SERIES.

Arranged at the north-east corner of the room; consisting of raw skins, the various astringent substances used in tanning; specimens of the chief varieties of leather; tanners' tools, leather-dressers' tools, tools used in currying leather. Uses of leather—boot and shoe making; manufacture of lasts by hand and by machinery; leather, silk, and satin boots and shoes. Book-binding, tools used; illustrations of bookbinding, showing the progress of the art. Glove-making. Saddlery,—saddlers' and collar-makers' tools. Manufacture of parchment; tools used, and process employed. Gold-beaters' skin. Manufacture of glue.

4.—HORN AND BONE SERIES.

Grouped together on the east side of the room ; including the horns of the ox, buffalo, deer, rhinoceros, &c. Manufactures of horn ; comb-making, drinking-cups, buttons, &c. Tortoise-shell, its manufacture, tools used, &c. Bone, manufacture of tooth-brushes. Teeth. Ivory, fine and common turning. Narwhal and other tusks used as substitutes for ivory, &c.

5.—FUR SERIES.

Placed south of the horn and bone series. Specimens of some of the chief furs used for ornament, clothing, or furniture ; illustrations of their uses.

6.—BRISTLE SERIES.

Immediately below the fur series ; including the chief varieties of bristles imported ; and illustrations of their use in brush-making. Household brushes, hair-brushes, of wood and ivory, tooth-brushes, artists' brushes, painters' brushes and tools. Illustrations of different modes of brush-making.

7.—FEATHER SERIES.

Arranged on the central horse-shoe table beginning at the north-east pillar. Samples of all the chief kinds of feathers used in upholstery ; illustrations of their purification. Manufacture of writing quills. Manufacture of artificial flies for fishing. Use of feathers for ornament, feather-flowers.

8.—HORSEHAIR SERIES.

Placed on the centre horse-shoe table at the south-east pillar. Horsehair, of all kinds, as imported. Illustrations of its chief uses, manufacture of horsehair seating, dyeing of horsehair, horsehair for brushes, horsehair buttons, horsehair pressing cloth, crinoline, and stock stiffening. Horsehair ornaments.

9.—LAC SERIES.

Arranged on the cross table between the two south pillars. Samples of all the varieties of lac, as imported. Manufacture of lac dye, bleaching of lac, manufacture of sealing-wax, preparation of lake, &c.

10.—WAX SERIES.

Placed opposite the fur series. Wax of all countries, bee-hives and bees, bleaching of wax, manufacture of wax candles, colouring of wax, artificial wax-flowers. Chinese wax, &c.

11.—OIL SERIES.

Adjoining to the wax series ; including the chief oils and fats used in the arts. Their purification ; manufacture of soap and candles, stearine, stearic acid, &c.

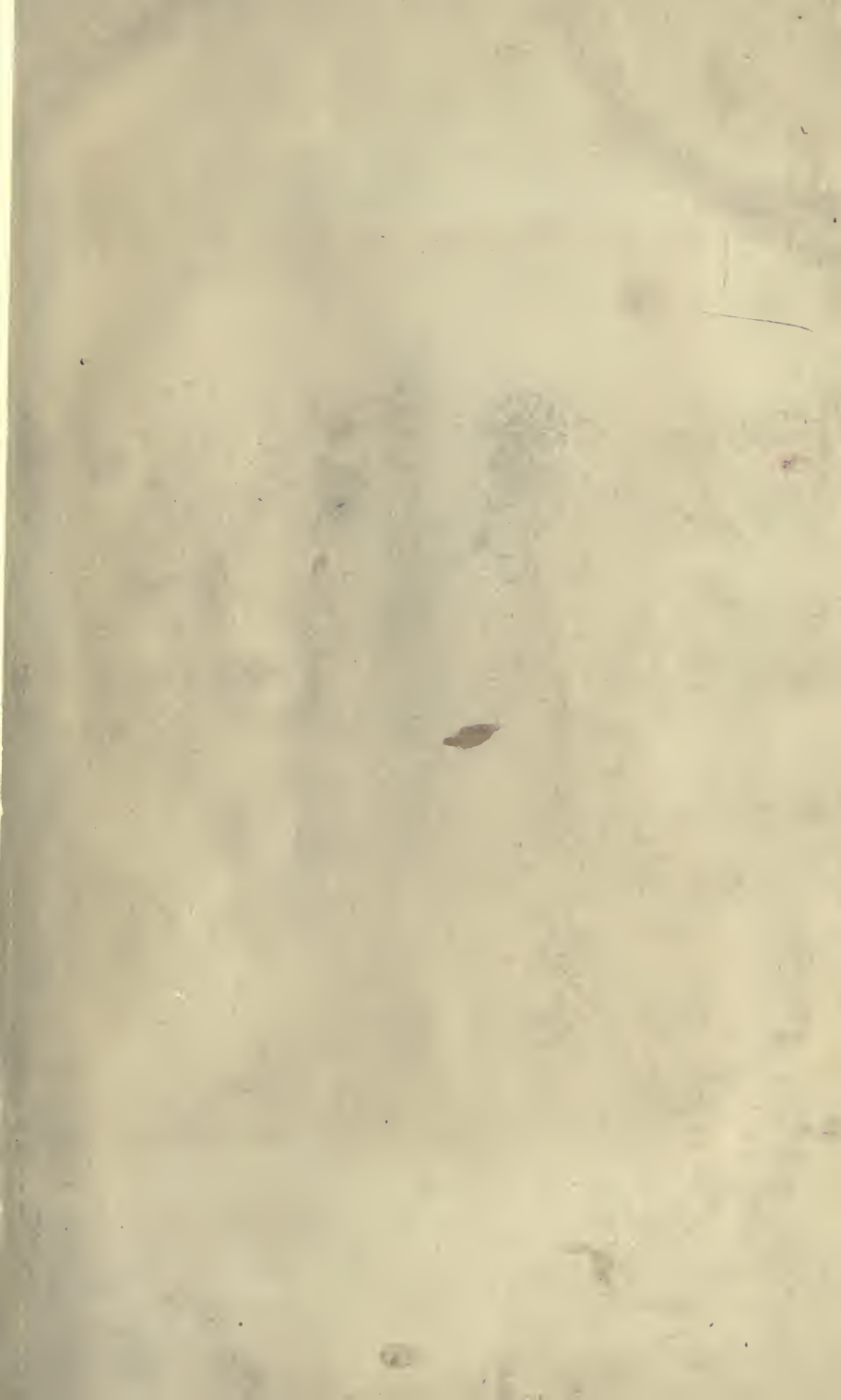
12.—SHELL SERIES.

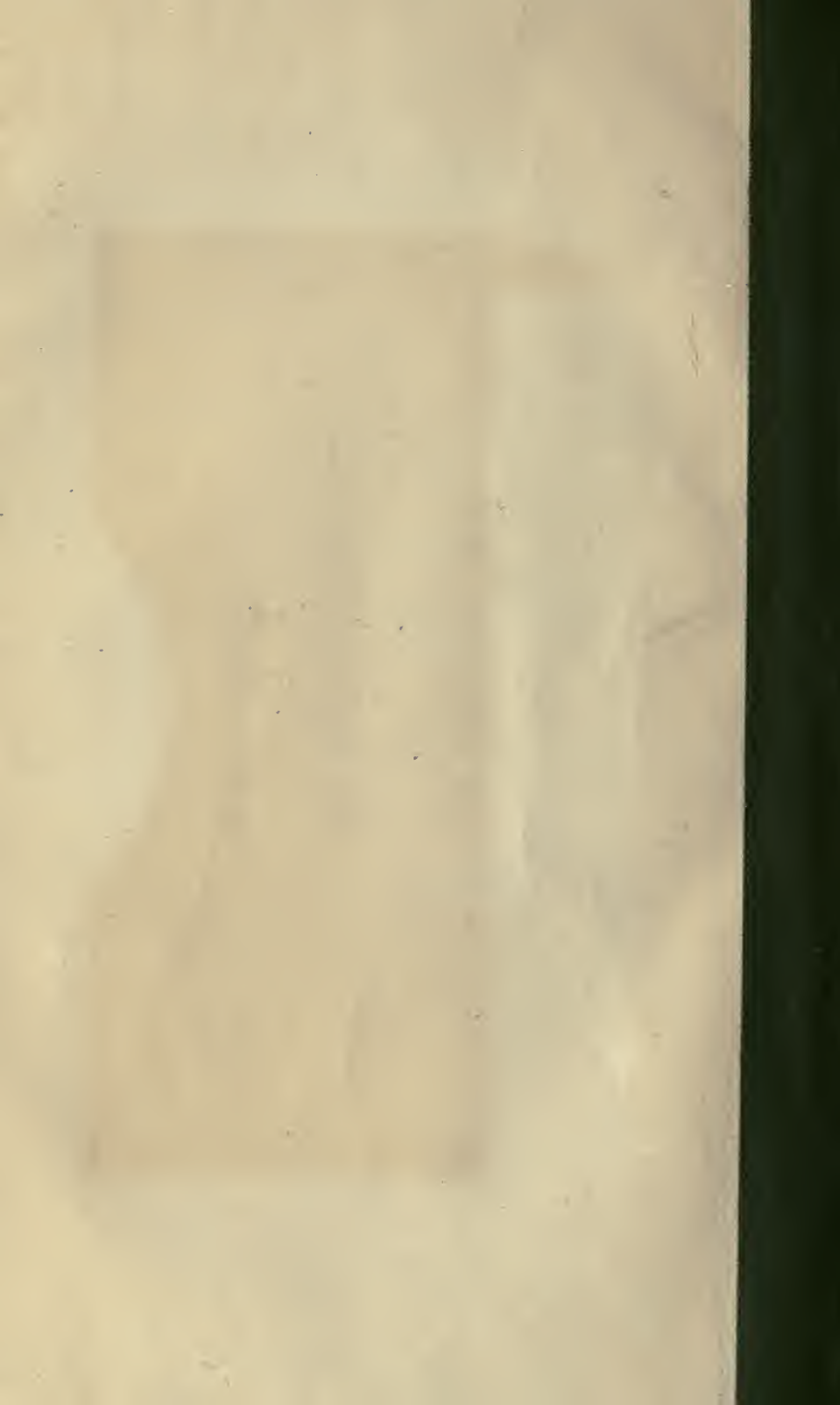
Placed opposite the horn series. Mother-of-pearl shells, as imported, and the same cut and polished. Uses of shell for ornament, inlaying in papier-maché, &c.

13.—REFUSE MATTERS.

Arranged on the shelves adjoining to the shell and oil series. Refuse animal matters derived from the previously illustrated arts, showing the uses to which they are applied. Manures ; manufacture of ammonia, prussiate of potash, phosphorus, &c.

**** Several of the minor series are not exhibited for want of space.*





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Solly, Edward
On the mutual relations of trade and manu-
factures.

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